From:	SEEDS Joshua
To:	Henning, Alan
Subject:	FW: Hinkle Creek, Heat Source, & Thermal Recovery
Date:	Wednesday, August 13, 2014 10:58:39 AM
Attachments:	image002.png Hinkle map.jpg

FYI

From: SEEDS Joshua
Sent: Thursday, July 17, 2014 12:21 PM
To: FOSTER Eugene P; MICHIE Ryan
Cc: SEEDS Joshua
Subject: Hinkle Creek, Heat Source, & Thermal Recovery

Some thoughts about the industry statements at the EQC meeting on June 19th and the Board of Forestry workshop on June 23rd. Several industry folks (and Arne Skaugset) asserted that:

1. A model (referring obliquely to Heat Source) couldn't have predicted the temperature response at Hinkle Creek paired watershed study, based on a graduate student with an unnamed model being unable to do so.
2. The Hinkle Creek results show that temperature responses are transient and don't transmit far downstream.
3. An analysis shows that Hinkle Creek is similar to 60% of western Oregon (no details on what factors were explored).
4. Ten years is too long for thermal recovery, and RipStream data show recovery before 5 years.
5. High temperatures in beaver ponds in the Trask do not show elevated temperatures as a results downstream, so temperature effects must not transmit downstream.

1. This assertion says nothing about the performance of a Heat Source model calibrated for Hinkle Creek. The Drift Creek tributary model is calibrated for the Drift Creek tributary, and we would expect it to behave differently than a model calibrated for Hinkle Creek. More importantly, this is an assertion with no evidence behind it.
2. This is misleading for several reasons.
    a. Three type-N streams increased in temperature, one (with >80% shade from slash) decreased. The Kibler *et al* 2013 paper analyzed the pooled effect of these streams and found the net effect was zero. There were no *net* effects to be detected at the watershed outlet. It is therefore unsurprising that the South Fork outlet would have no significant changes in temperature.
    b. There were three units harvested in the South Fork watershed during 2001, the year that *pre-harvest* monitoring began. One of those was directly downstream of the 2005 type-N harvest unit on Clay Creek (see attached map). This unit would have been in the warmest part of thermal recovery during the pre-harvest calibration period, giving an artificially high pre-harvest baseline calibration by skewing the relationship with the control catchment. Therefore, the temperature responses post-harvest appear statistically to be below the artificially high baseline, creating the false appearance that temperatures have responded to harvest by decreasing. This can be seen in the graphic they presented at the workshop (see below): the post-harvest "decrease" begins at the first temperature probe in the partially recovered 2001 unit. This would affect the calibration of everything downstream of that 2001 harvest unit, including creating an artificially high baseline at the watershed outlet of the South Fork.
3. This is a geographic analysis using climatic, vegetation, and geological variables in a cluster and principle components analysis. The thesis is by Tyler Bax from 2008 (Duke University). There are several ways he sliced similarity, but only at the coarsest (and least predictive) level was Hinkle Creek similar to 60% of western Oregon forestland. The thesis is of interest, but I think taking the industry's interpretation of its finding requires a large grain of salt. Hinkle Creek is on the margins of the clouds of data points in the ordination space from the principle components analysis, for instance, reflecting substantive difference from other locations.
4. RipStream data in fact show that thermal recovery is not complete by year 5, but is on average near 0.3°C. Streams that warmed more tend to have recovered more. I checked with Bob Bilby to see if I missed any relevant literature and to learn the basis of this assertion. While one of the studies I cited (his) looked at landslide recovery not harvest-with-retention, it should be noted that much of the stream network in western Oregon has no retention and that the narrow buffers on smaller fish-bearing streams tend to blow down.

Some work by R.D. Moore put recovery at 5-10 years. There is probably utility in looking at shorter time scales (7 or 8 years; recovery may be faster in the Coast Range), and Bob suggested longer time scales would be in order for eastern Oregon which does make sense with slower vegetation growth. However, at this time, there is no pressing need in my opinion to redo any analyses, although we may want to consider how to address this for the MidCoast analysis. I'll forward Bob's response to my query.

5. In addition to the scale on the graph presented being too large to discern smaller temperature shifts, there are serious questions about the relevance of this information. How deep was the thermistor in the beaver pond: near the top, middle, bottom? Beaver ponds are known to be thermally stratified with higher temperatures at the top, like other reservoirs. Cold water entering the pond can flow below the warm, still upper layers and out through the dam, insulated from solar energy by the warm water above. Beaver ponds can make downstream temperatures higher or lower, depending on many factors. Beaver ponds can lead to colder downstream temperatures (i.e. downstream temperatures can increase after beaver pond removal), but they can also have the opposite effect for reasons that aren't fully understood. They also have major effects on hydrology that make a comparison between beaver ponds and timber harvest untenable.

Let me know if you have anything to add. At this point, we can probably move one from this unless ODF, the Board, or others ask us more information.

Thanks,

Josh

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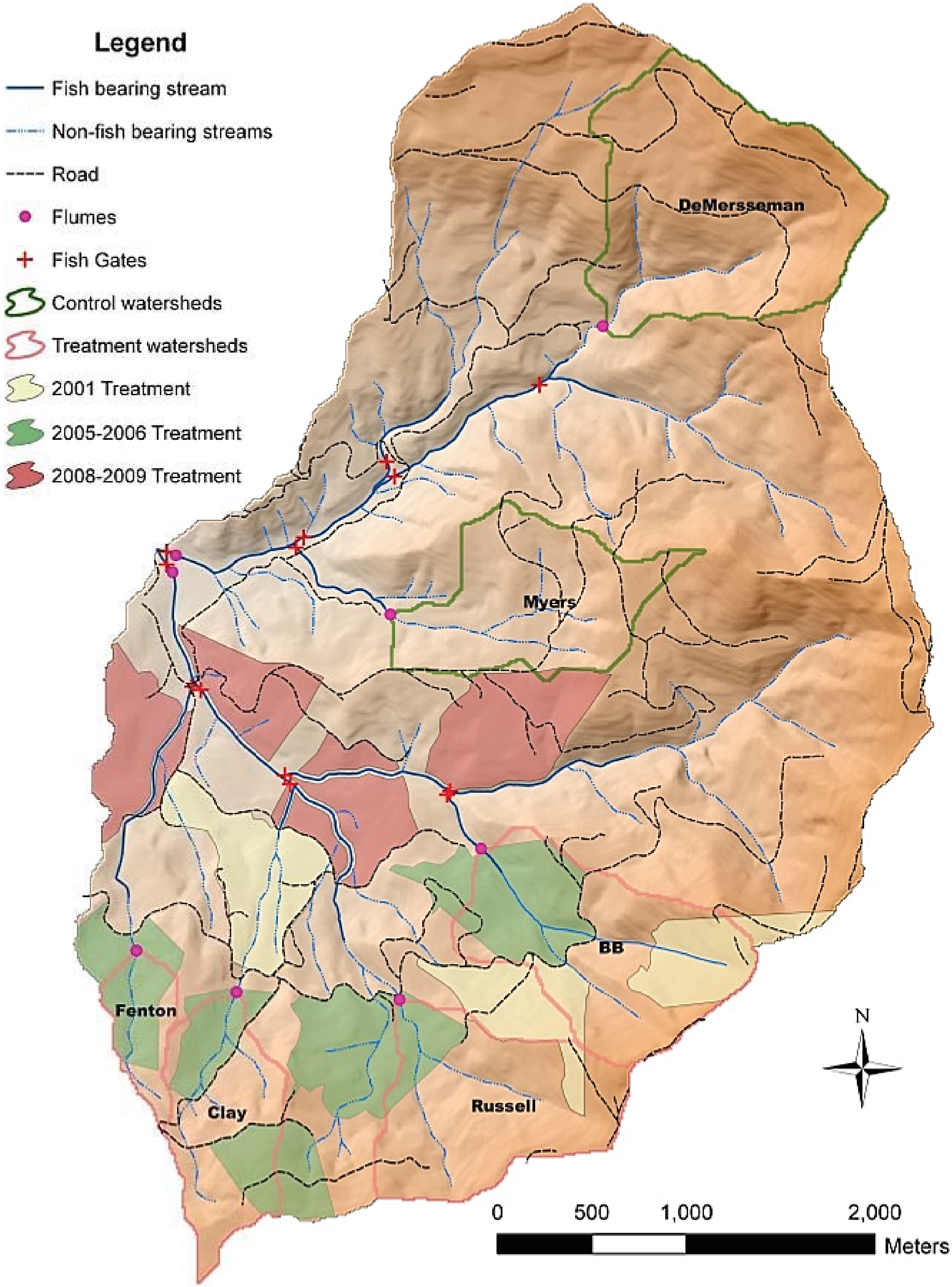

Legend
Fish bearing stream
Non-fish bearing streams
Road
Flumes
Fish Gates
Control watersheds
Treatment watersheds
2001 Treatment
2005-2006 Treatment
2008-2009 Treatment
DeMersseman
Myers
BB
Fenton
Clay
Russell
N
0
500
1,000
2,000
Meters